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Case No.: 54135US011

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	BOWERS, JOHN L.		
Application No.:	09/986346	Group Art Unit:	3753
Filed:	November 8, 2001	Examiner:	John A. Rivell
Title:	UNI-DIRECTIONAL FLUID VALVE		

BRIEF ON APPEAL

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR § 1.8(a)]

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March 4, 2005 — Date

Susan M. Dacko — Signed by: Susan M. Dacko

Dear Sir:

This is an appeal from the Office Action mailed on October 4, 2004, finally rejecting claims 16, 17, 19-25, 41, 43-47, 49-54, 64, 66-70 and 72-121.

A Notice of Appeal in this application was mailed on January 4, 2005, and was received in the USPTO on January 4, 2005.

The fee required under 37 CFR § 41.20(b)(2) for filing an appeal brief should be charged to Deposit Account No. 13-3723.

Appellants request the opportunity for a personal appearance before the Board of Appeals to argue the issues of this appeal. The fee for the personal appearance will be timely paid upon receipt of the Examiner's Answer.

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Real Party In Interest

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

Related Appeals And Interferences

Appellants are unaware of any related appeals or interferences.

Status Of Claims

Claims 16-17, 19-25, 41, 43-47, 49-54, 64, 66-70, 72-121 are pending in this case and are the subject of this appeal. Claims 16, 17, 19-25, 41, 43-47, 49-54, 64, 66-70, and 72-89[1] have been indicated as being allowable, provided an alleged defective oath/declaration is corrected.

Status Of Amendments

On December 6, 2004, Applicants filed an amendment after the final rejection. In this amendment, claims 16, 19, 21, 24 and 90 had been amended. Applicants, however, have not received notice from the USPTO regarding the status of this amendment and whether the claim changes have been entered.

Summary Of Claimed Subject Matter

To improve the comfort and efficiency of filtering face masks, the manufacturers of these products commonly provide the mask with a uni-directional exhalation valve. These valves open under a pressure differential generated by the wearer when they exhale. The exhalation valves preferably allow for a relatively unrestricted flow of the exhalate out of the mask and remain closed under other conditions.

Known exhalation valves have commonly used a circular diaphragm of flexible rubber and a cooperating circular seal surface that surrounds the valve orifice. The user's exhalate passes through the orifice to exit the mask interior. The diaphragm is clamped at its center, and its marginal portions flex away from the seat when the user exhales. These types of valves are

[1] We believe the Examiner intended to say claims 72-88, not 72-89 since claim 89 has been rejected under 35 USC § 103.

known as "button-style" valves. In another known type of the valve, the diaphragm is in the form of a flexible flap that is attached to a cooperating seat structure at one end, that is to say, in cantilevered fashion. See U.S. Patents 5,509,436 and 5,325,892 to Japuntich, GB 2,072,516 to Simpson, and EP-A 0 252 890 to Söderberg for examples of cantilevered valves.

In designing an exhalation valve, it is important to maximize the cross-sectional area of the open orifice to allow for a free flow of exhalate through the valve, and also to minimize the differential air pressure required to open the valve (i.e. the valve "cracking" pressure). Centrally clamped diaphragm valves generally require a greater opening force when compared to cantilevered valves of equivalent size because the available "lever arm" is less. The structure of a cantilevered valve, when open, also generally presents less airflow obstruction than the centrally clamped circular diaphragm type valve, which can create lower pressure drops across the valve. A potential problem that has been addressed in the design of a cantilivered valves lies in ensuring that the flap will remain closed in all orientations of the structure when it is not subject to an exhalatory pressure differential (see the Japuntich patents). To minimize the opening pressure differential of the valve, however, it is desirable to use a highly flexible flap of minimal thickness. The flexibility of the flap, however, may cause the flap to droop away from the valve seat when the user is not exhaling and the valve is inverted (that is, when the valve is oriented with the seat lying above the flap). This inadvertent opening of the valve is undesirable because it may provide a path into the mask through which unfiltered contaminants may enter.

The Japuntich patents mentioned above disclose an exhalation valve that has a cantilevered flap in which the valve seat has a seal ridge that is curved in the longitudinal direction of the flap. The curvature corresponds to a deformation curve exhibited by the flap when it bends under its own weight (with no pressure differential). The Japuntich design recognizes that the flap may flex away from the valve seat when the structure is inverted and thus matches the configuration of the seat to the curvature of the flap under that condition.

In accordance with the present invention, the exhalation valve comprises a filter mask that comprises: (a) a mask body; and (b) a unidirectional exhalation valve that is secured to the mask body. The unidirectional exhalation valve comprises a flexible flap and a valve seat. The flexible flap has a stationary portion and a free portion and has a peripheral edge that includes a stationary segment and a free segment. The stationary segment is associated with the stationary portion of the flap so as to remain stationary during an exhalation, and the free segment of the flap

is associated with the free portion of the flap so as to be moveable during an exhalation. The stationary and free segments of the peripheral edge are disposed at opposing ends of a longitudinal dimension of the flap. The valve seat has at least one port to allow exhaled air to exit the mask body when worn on a person. The valve seat also comprises a seal surface onto which the stationary and free portions of the flap make contact when no fluid is passing through the port(s). The free portion of the flap is capable of being lifted from the seal surface when a wearer exhales to allow exhalate to exit the mask. The seal surface surrounds the port(s) so that when the stationary and free portions of the flap are in contact with the seal surface fluid cannot pass through the port(s) in an opposite direction to enter the mask. The flexible flap is mounted to the valve seat in a cantilevered manner and to create a fixed curvature in the flap in a direction transverse to the longitudinal dimension. The fixed curvature is accomplished by exerting a force on the flexible flap to move the flap towards the valve seat such that the flap, at the location where the force is exerted, is non-aligned with the seal surface. The exerted force and the non-aligned relationship between the seal surface and the flap at the location of the force, impart the curvature and bias the flap towards the seal surface to enable the free portion of the flap to maintain substantial contact with the seal surface under any orientation of the mask when a fluid is not passing through the valve seat port(s).[2]

The effect of the transverse curvature of the flap in a valve according to the invention is therefore to stiffen the flap sufficiently to resist any drooping away from the seat when there is no applied pressure differential, even in the inverted orientation of the structure. As soon as the flap is "cracked" by an appropriate pressure differential, however, the free end of the flap will rapidly flex away from the seat and this flexure will progress along the length of the flap to a position determined by the instantaneous rate of fluid flow. The stiffening effect of this transverse curvature is therefore to be distinguished from the longitudinal curvature of the flap described in the Japuntich patents.

ISSUES TO BE REVIEWED ON APPEAL

Issue One

1. Do claims 19 and 90 fail to meet the enablement requirement under 35 USC § 112?

[2] This paragraph essentially describes the invention recited in claim 92. Other inventive embodiments are outlined in

Issue Two

2. U.S. Patent 5,509,436 to Japuntich et al. (Japuntich) discloses an exhalation valve that is curved in its longitudinal dimension. U.S. Patent 5,295,478 to Baldwin describes a mouth-to-mask resuscitator that has an inhalation valve that also is longitudinally curved. The Examiner asserts that the Baldwin flap is also inherently curved in the transverse direction, albeit not illustrated or described in Baldwin's specification. Would the combination of Japuntich and Baldwin have rendered obvious the subject matter of clams 89-121, which all require a transversely curved flap?

Issue Three

3. Are claims 16, 17, 19-25, 41, 43-47, 49-54, 64, 66-70 and 72-121 unpatentable under 35 USC § 251 because of a defective reissue oath?

ARGUMENT

Issue One

Claims 29 and 90 have been amended to overcome this rejection. Applicants, however, have not received a reply to the amendment filed on December 6, 2004 and therefore do not know if this rejection has indeed been overcome. To the extent it has not been overcome, applicants reserve the option to address the issue more fully in their reply brief, if needed.

Issue Two

Claims 89-121 have been rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent 5,325,892 to Japuntich et al. (Japuntich) in view of U.S. Patent 5,295,478 to Baldwin. Applicant respectfully submits that this rejection cannot be sustained for the following reasons.

1. Firstly, neither Japuntich nor Baldwin teach or suggest imparting a transverse curvature to a flexible flap. Japuntich and Baldwin both disclose a flexible flap that is transversely curved. In these references, the illustrated flap is only curved in the longitudinal dimension.

Applicant has explained the difference between a flap that is curved in a longitudinal dimension but not in a transverse dimension in the background section of this application. In

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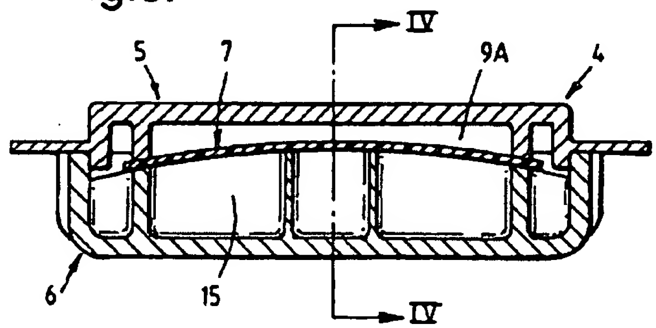
the other independent claims.

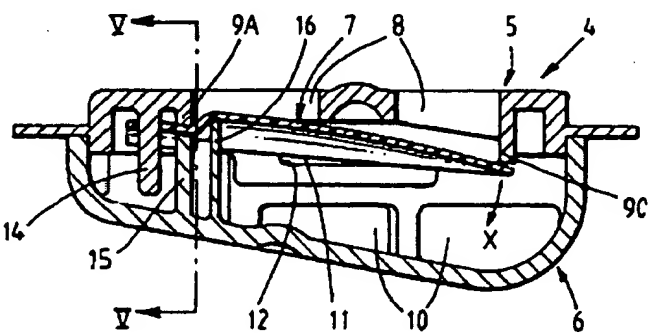
particular, applicant explains that the [Japuntich] flap is "curved in the longitudinal direction of the flap" and that their invention is different from the Japuntich construction because applicant's flap has a "transverse curvature".[3] As the terms "longitudinal" and "transverse" are used in applicant's specification and in the claims, the longitudinal dimension is the dimension that extends from the stationary portion of the flap towards the free peripheral edge of the flap; whereas the transverse dimension extends across the flap, normal to the longitudinal direction or dimension. The Board's attention is directed in particular, to Figure 5 of applicant's specification, which shows an example of an arched transverse curvature that extends across the flap:

Fig.5.



Applicant's flap may, however, also be curved in the longitudinal dimension as shown in Figure 4:

Fig.4.



As indicated, a longitudinally-curved flap is shown in U.S. Patent 5,325,892 to Japuntich:

[3] Please see applicant's specification at column 1, lines 55 to column 31, of the originally issued 5,687,767 patent.

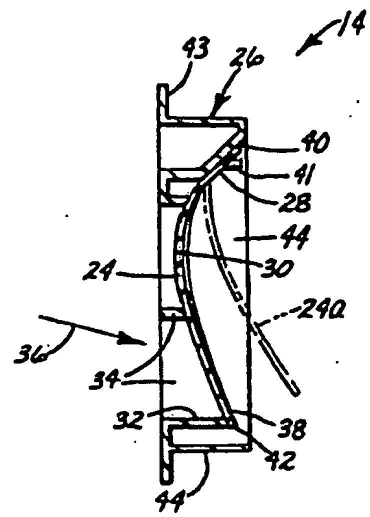
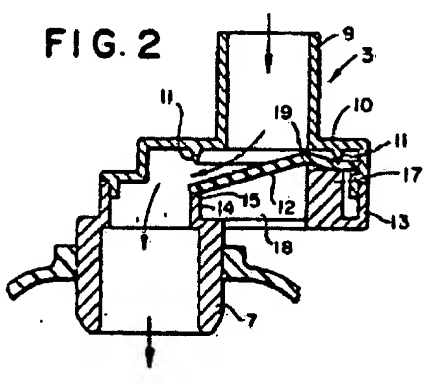


Fig. 3

The Japuntich flap 24 is curved in the direction extending from the stationary portion 28 of the flap 24 to its free peripheral edge 42. The valve that is used in the Baldwin resuscitator also is curved in its longitudinal dimension:

FIG. 2



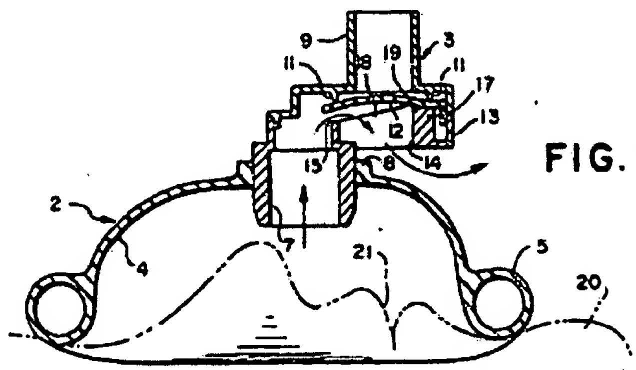
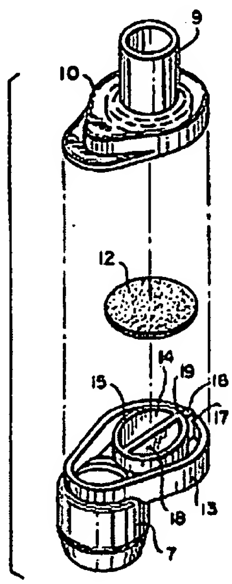


FIG. 3

Baldwin does not, however, show that its flap is curved transversely. Nor does the Baldwin specification mention a transverse curvature.

As shown in Figure 4 of Baldwin, it uses a circular flap 12:

FIG. 4



The Baldwin circular flap 12 has a longitudinal dimension or direction that extends from the stationary portion of the flap, which stationary portion extends mainly from the outer portion 19 of the rib 18 along the top surface 16 of post 17 of housing 13. The dimension from this stationary portion to the opposing free edge or end of the Baldwin flap defines the longitudinal dimension. The transverse dimension extends across the flap, normal to the longitudinal dimension. Although the Baldwin flap is circular and is held in place a substantial distance inward from the stationary edge of the flap, it nonetheless is "cantilevered" because it opens at one end and is not centrally mounted. Thus, although the circular Baldwin flap 12 admittedly has a longitudinal dimension and is cantilevered, the reference does not suggest the present invention because its flap does not have a transverse curvature imparted to it. Nowhere is there any statement in Baldwin's description that indicates that the flap 12 is transversely curved. Further, neither of Baldwin's cross-sectional views (Figure 2 or Figure 3 reproduced above) show such a transverse curvature. Thus, if Baldwin intended or desired a transverse curvature — or suggested such a curvature to a person of ordinary skill — you would have expected that curvature to have been mentioned in the Baldwin specification or illustrated somewhere in the Baldwin drawings. This, however, is not the case.

The Examiner indicated during the interview, however, that such a transverse curvature could inherently occur by virtue of the mounting structure that is employed for securing Baldwin's flap 12 to its resuscitator housing. In response to this position, applicant reminds the Examiner that

"inherency cannot be established by mere probabilities or possibilities."[4] The mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish that the reference inherently possesses the subject matter of a claimed invention.[5] To establish inherency, the reference "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill."[6] The record does not establish that the transverse curvature is "necessarily present" in Baldwin; nor does the record establish that a person of ordinary skill would have "recognized it" from reading the Baldwin disclosure. Baldwin's complete silence in its written description and its complete failure to illustrate a transverse curvature in the drawings provide nothing to hint that a transverse curvature would be necessarily present, and recognizably so, in the Baldwin disclosure. Thus, Baldwin cannot properly be relied on for inherently teaching or suggesting a transverse curvature.

2. Secondly, the records lacks any evidence of a motivating reason for combining the pertinent teachings of Japuntich with Baldwin. Thus, even if Baldwin did suggest the use of a transverse curvature in its circular valve flap 12 such that a person of ordinary skill would recognize the suggestion, neither Baldwin nor Japuntich, nor any other reference of record, indicates why a person of ordinary skill would have been motivated to use Baldwin's teachings in Japuntich. The Japuntich patent clearly shows a method for mounting a flexible flap to a valve seat to provide a minimal force for keeping the flap closed under any orientation of the valve. Japuntich does this by tracing the longitudinal curvature of the flap when it is supported towards one end. Please note that the Japuntich valve functions so well that, in some instances, greater than 100% of the exhaled air can exit the mask at high flow volumes (see examples 11-13 in the Japuntich patent). Imparting a transverse curvature to the Japuntich valve, which already remains closed under any orientation, could only hamper the performance of the valve. Thus, if the prior art valve performs extraordinarily well, and if the combination of teachings would have had a deleterious effect on valve performance, there surely would not have been any motivating factor for combining the references.

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[4] *Continental Can Co. v. Monsanto Co.*, 948 F2d. 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991); see also *In re Robertson*, 169 F3d. 743, 745 (Fed. Cir. 1999) ("Inherence, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.").

[5] *Id.*

[6] *Id.*

3. Thirdly, even if the record presented a teaching of a transversely curved flap configuration in Baldwin — and even if the record did include a motivating reason for combining Japuntich and Baldwin — there still remains the question of whether Baldwin teaches or suggests a non-aligned relationship between the seal surface and the flap at the location where the force is exerted on the flap to bias the flap towards the seal surface. Baldwin only states that "the portion of the peripheral edge 15 and the outer portion 19 of the rib 18 adjacent to the post 17 is higher than the top surface 16 of the post 17 to thereby form a hinge for biasing the disk valve 12 against the annular knife edge 11." The reference does not state or illustrate whether there is a nonaligned relationship to cause a bias. For these reasons, the obviousness rejection cannot be properly sustained based on Japuntich and Baldwin.

It is worth mentioning here that Baldwin describes an inhalation valve. On filtering face masks, inhalation valves do not need to remain closed when a wearer is not inhaling. This is because the air passing through the inhalation valve has already passed through the filter media. Thus, the valves do not exhibit a bias to the closed position. Further, inhalation valves are used on masks that use filter cartridges: they are not used on filtering face mask bodies like those described in Japuntich. Baldwin, of course, is not disclosing a respiratory mask that uses filter cartridges or a fluid permeable filter mask body like Japuntich. Rather, Baldwin describes a resuscitator, but as such, it also has no need for the inhalation valve to remain closed under any orientation. Like the inhalation valves that are used on cartridge-bearing respirators, it does not matter if the valve is open during non-use or periods of inhalation. In fact, you want the valve to open as easy as possible and thus there is no reason to create a bias on the flap to keep it closed. The flap automatically closes as a result from the force of the user's exhalation breath.

In summary, applicant's invention would not have been obviousness to a person of ordinary skill because: (1) neither reference teaches or suggests a traverse configuration, inherently or otherwise, (2) the record fails to contain any evidence of why a person of ordinary skill would have been motivated to make the combination set forth in the Office Action, and (3) Baldwin does not describe, suggest, or desire a valve that is biased to the closed position when a wearer is not exhaling (Baldwin's valve only becomes biased to the closed position as a result of force from the user's exhalation).

Issue Three

This application has been rejected under 35 USC § 251 for the following reason:

> The reissue oath/declaration fails to identify at least one error which is relied upon to support the reissue application. See 37 CFR 1.175(a)(1) and MPEP § 1414. As this application is a Continuation Reissue application, the currently filed oath/declaration lists "errors" correctable by reissue which were in the original patent. These "errors" were then corrected during prosecution of the parent Reissue application Ser. No. 09/442,082 now Reissued Patent RE 37,974. Accordingly, any Reissue oath/declaration filed in a continuation Reissue application must list "errors" allegedly now in the Reissued patent (RE 37,974, Ser. No. 09/442,082). As the original patent has been surrendered in favor of Reissued Patent RE 37,974, there are in fact no "errors" in the original patent because there now is no "original" patent. The act of filing a Continuing Reissue application presumes there are in face now "errors' in the Reissued Patent (37,974). In accordance with 37 CFR 1.175(b)(1), a supplemental reissue oath/declaration under 37 CFR 1.175(b)(1) must be received before this reissue application can be allowed.

Applicant respectfully takes issue with this position. 37 USC § 251 specifically states that "[t]he Commissioner may issue several reissue patents for distinct and separate parts of the thing patented, upon demand of the applicant, and upon payment of the required fee for a reissue of each of such reissued patents." The implementing rule, 37 CFR § 1.177 indicates the following:

> The office may reissue a patent as multiple reissue patents. If applicants files more than one application for the reissue of a single patent, each such application must contain or be amended to contain in the first sentence of the specification a notice stating that more than one reissue application has been filed and identifying each of the reissue applications by relationship, the application number and filing date.

Because the applicant has paid the required fees and has amended the application to insert the required first sentence, applicant has accordingly complied with the law and is entitled to file multiple reissue patent applications. If applicants were required to state that they were correcting "errors in the reissued patent", such a requirement would run counter to the statute and implementing rule, which clearly allow several reissued patents for distinct and separate parts of the thing patented. Further, 37 CFR § 1.175(e) explicitly states that:

> The filing of any continuing reissue application which does not replace its parent reissue application must include an oath or declaration which, pursuant to paragraph (a)(1) of this section, **identifies at least one error in the original patent** which has not been corrected by the parent reissue application or an earlier reissue application.

Applicant will submit a Supplemental Oath/Declaration that covers all the changes made to this application since its filing and that identifies at least one error in the original patent that has not been corrected by the parent reissue application. Applicant does not believe that he needs to recite an error in Reissue Patent RE 37,974. Please also consider that this continuation application was filed before the issue date of U.S. Patent Re 37,974 and that the effective surrender date of the originally issued patent 5,687,767 does not take effect until issue of the reissued patent.[7]

For these reasons, applicant respectfully submits that all claims in this application are in condition to be allowed. Please further examine this application in light of this Amendment and the remarks provided above.

CONCLUSION

For the foregoing reasons, appellants respectfully submit that the rejections under 35 USC §§ 121, 251 have been overcome and the rejections under 35 USC §§ 121, 251 should be reversed. Examiner has erred in rejecting this application.

Respectfully submitted,

March 4, 2005
Date

By: ______
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Office of Intellectual Property Counsel
3M Innovative Properties Company
Facsimile No.: 651-736-3833

[7] 35 USC § 252 ("The surrender of the original patent shall take effect upon issue of the reissued patent....").

CLAIMS APPENDIX

16. (currently amended) An exhalation permitting filter mask assembly for positioning over the mouth and nose of a user, the filter mask assembly comprising:

a mask configured to fit over the nose and mouth of a user and including filter material through which air can be inhaled by a user while effecting filtration of the inhaled air;

a uni-directional valve mounted to the mask for permitting exhalation through the valve while precluding inhalation through the valve;

the valve including a flexible flap having a root end portion, opposite side portions and a free end portion, an upper housing member, an inlet port and a valve seat surrounding the inlet port and being part of the upper housing member and including a sealing surface adjacent the inlet port;

the valve further including a lower housing member that includes a flap-engaging member;

the flexible flap being fixedly mounted at the root end portion relative to the upper housing member in a manner so that the free end portion makes sealing contact with the sealing surface when the flexible flap is closed and so that the free end portion of the flexible flap lifts from contact with the sealing surface and moves outwardly of the sealing surface when exhaled air passes through the inlet port; and

the flexible flap having a transverse curvature extending medially of the flap imparting sufficient stiffening to the flexible flap to maintain the flexible flap in sealing contact with the sealing surface for any orientation of the filter mask during normal operating conditions in the absence of a pressure differential across the flexible flap

wherein the transverse curvature is imparted to the flexible flap by having the flap-engaging member contact the root end portion of the flexible flap such that the flap is held against the sealing surface of the upper housing member and such that a portion of the flap resides in non-alignment with the sealing surface of the upper housing member when the valve is viewed in a longitudinal section (FIG. 4).

17. (previously presented) A filter mask assembly as recited in claim 16, wherein the flexible flap is formed of elastomeric material.

18. (canceled)

19. (currently amended) A filter mask assembly as recited in claim 16, wherein the lower housing member faces the upper housing member, and wherein the root end portion of the flexible flap is trapped and fixedly positioned between facing surfaces of the upper housing member and the lower housing member.

20. (previously presented) A filter mask assembly as recited in claim 19, wherein the facing surface of the lower housing member is a curved surface.

21. (currently amended) A filter mask assembly as recited in claim 19, wherein that part of the sealing surface of the valve seat which the free end portion of the flexible flap contacts is a flat surface.

22. (previously presented) A filter mask assembly as recited in claim 19, wherein the sealing surface is provided on a portion of a seal ridge surrounding the inlet port.

23. (previously presented) A filter mask assembly as recited in claim 22, wherein the seal ridge comprises four linear seal ridge members and the facing surface on the lower housing is provided on a profiled block aligned with one of the linear seal ridge members.

24. (currently amended) A filter mask assembly as recited in claim 23, additionally including a second profiled block provided in the lower housing member engaging a central portion of the flexible flap outwardly of the root end portion to urge the central portion toward the upper housing to enhance the transverse curvature of the flexible flap.

25. (previously presented) A filter mask as recited in claim 16, wherein the filter material comprises at least one sheet incorporating filter material.

26-40 (canceled)

41. (previously presented) A filter face mask comprising:

a mask body adapted to fit over a nose and a mouth of a wearer; and

an exhalation valve mounted to the mask body;

the exhalation valve comprising a flexible flap and a valve seat;

the flexible flap being mounted to the valve seat in cantilever fashion for movement between open and closed positions;

the flexible flap having a longitudinal dimension and a free end that rests upon the valve seat when in closed position;

the flexible flap also having a transverse curvature in a direction transverse to the flap's longitudinal dimension;

the transverse curvature biasing the flexible flap to effect positioning and retention of the flexible flap in the closed position in the absence of an opening pressure differential across the flap for any orientation of the valve

wherein the flexible flap has maximum transverse curvature at the location where the flexible flap is mounted to the valve seat.

42. (canceled)

43. (previously presented) The filter mask of claim 41, wherein the transverse curvature of the flexible flap progressively decreases toward the free end of the flexible flap.

44. (previously presented) The filter mask of claim 41, wherein the transverse curvature is imparted to the flexible flap by virtue of its mounting to the valve seat.

45. (previously presented) The filter mask of claim 44, wherein the flexible flap is mounted to the valve seat by being pressed towards the seat by a member disposed on a valve cover.

46. (previously presented) The filter mask of claim 41, wherein the exhalation valve is so located on the mask such that during normal head movements of a wearer, the free end of the flexible flap is generally directed downwardly.

47. (previously presented) A filter face mask that comprises:

a mask body adapted to fit over a nose and mouth of a wearer for filtering inhalation air; and

an exhalation valve mounted to the mask body, the exhalation valve including a flexible flap, a first housing defining a valve seat and including a seal ridge terminating in a seal surface, and a second housing defining a valve cover;

the first housing including one or more inlet ports, the one or more inlet ports being surrounded by the seal ridge;

the second housing including one or more outlet ports and being joined to the first housing;

the flexible flap having only one stationary portion and only one free portion and a peripheral edge that includes both stationary and free segments, the flap also having a longitudinal axis extending in a direction between the free and stationary segments of the flap;

the stationary portion of the flexible flap being held in a stationary position in contact with a portion of the seal ridge such that the stationary segment of the peripheral edge remains stationary during exhalation, and the free portion of the flap being movable during exhalation such that the free segment of the peripheral edge moves away from the seal surface and the free portion of the flap lifts off of the seal surface; and

the flexible flap having a curvature in a direction transverse to the longitudinal axis, the transverse curvature being imparted to the flexible flap by the mounting of the flexible flap in contact with a portion of the seal ridge, the mounting of the flap causing the stationary portion of the flap to be pressed towards the seal ridge such that at least a portion of the stationary portion resides in non-alignment with the seal surface when viewing the valve in a longitudinal section (FIG. 4); the transverse curvature effecting biasing of the free portion of the flexible flap towards the seal surface under neutral conditions so that the flap maintains substantial contact with the seal surface of the valve seat in the absence of exhalatory pressure differential across the flap in any orientation of the valve, while also allowing the free portion of the flexible flap to be lifted from the seal surface during an exhalation.

48. (canceled)

49. (previously presented) The filter face mask of claim 47, wherein the flexible flap is mounted to the valve in cantilever manner by being trapped between respective surfaces on the valve seat and the valve cover.

50. (previously presented) The filter face mask of claim 47, wherein the outlet ports are oriented on the valve cover relative to the flexing of the flexible flap such that exhaled air from a wearer exits the exhalation valve with a downward component that directs the exhalate away from a wearer's eyes.

51. (previously presented) The filter face mask of claim 47, wherein the seal surface has multiple portions that include first and second side portions and a free-end portion, the free segment of the peripheral edge of the flexible flap having a flat configuration above the first and second side portions and the free end portion.

52. (previously presented) The filter face mask of claim 47, wherein the flexible flap's transverse curvature progressively decreases towards an outer end of the free portion of the flexible flap.

53. (previously presented) The filter face mask of claim 47, wherein the valve seat and valve cover are inter-fitting plastic parts.

54. (previously presented) The filter face mask of claim 47, wherein said stationary portion of the flexible flap is permanently configured for embracing a portion of the valve seat.

55-63 (canceled)

64. (previously presented) A filter face mask that comprises:

(a) a mask body adapted to fit over a nose and a mouth of a wearer; and

(b) an exhalation valve mounted to the mask body, the exhalation valve comprising a flexible flap and a valve seat, the flexible flap being mounted to the valve seat in cantilever fashion such that it has a longitudinal dimension, the flexible flap having a free end that rests upon the valve seat when closed, the flexible flap exhibits a curvature in a direction transverse to the flexible flap's longitudinal dimension, the transverse curvature biasing the flexible flap to assist in closing the valve in the absence of an opening pressure differential across the flexible flap, under any orientation of the valve wherein the flexible flap has a transverse curvature at the location where the flexible flap is mounted to the valve seat.

65. (canceled)

66. (previously presented) The fluid valve of claim 64, wherein the transverse curvature of the flexible flap decreases in the longitudinal dimension toward a free end of the flexible flap.

67. (previously presented) The filter mask of claim 66, wherein the transverse curvature is imparted to the flexible flap by virtue of its mounting to the valve seat.

68. (previously presented) The filter mask of claim 67, wherein the flexible flap is mounted to the valve seat by being pressed toward the valve seat by a member disposed on a valve cover.

69. (previously presented) The filter mask of claim 64, wherein the exhalation valve is so located on the mask such that during normal head movements of a wearer, the free end of the flexible flap is generally directed downward.

70. (previously presented) A filter face mask that comprises:

(a) a mask body that is adapted to fit over a nose and mouth of a wearer; and

(b) an exhalation valve that is mounted to the mask body, the exhalation valve comprising a flexible flap, a valve seat, and a valve cover, the valve seat comprising one or more inlet ports, which one or more ports are surrounded by a seal surface, the valve cover comprising one or more outlet ports and being joined to the valve seat, the flexible flap being mounted to the valve seat and having only one stationary portion and only one free portion and a peripheral edge that includes stationary and free segments at opposite ends of a longitudinal axis of the flap, the stationary segment of the flexible flap's peripheral edge being associated with the stationary portion of the flexible flap so as to remain stationary during an exhalation, and the free segment of the flexible flap's peripheral edge being associated with the free portion of the flexible flap so as to be movable during an exhalation, the flexible flap having a curvature in a direction transverse to the longitudinal axis of the flap, the transverse curvature being imparted to the flexible flap by the mounting of the flexible flap at the stationary portion off-center relative to the flap and closer to the stationary segment of the flap's peripheral edge than to the free segment, the mounting of the flexible flap at the stationary portion being accomplished by having a member from the valve cover press against the flap to create sufficient curvature in the flap at a point where the member contacts the flap to cause at least part of the stationary portion to reside in non-alignment with the seal surface when viewing the flap in a longitudinal section (FIG. 4), the member causing a biasing of the free portion of the flexible flap toward the seal surface under neutral conditions while also allowing the free portion of the flexible flap to be lifted from the seal surface during an exhalation.

71. (canceled)

72. (previously presented) The filter face mask of claim 70, wherein the flexible flap is mounted to the valve by being trapped between respective surfaces on the valve seat and the valve cover.

73. (previously presented) The filter face mask of claim 70, wherein the outlet ports are oriented on the valve cover relative to the flexing of the flexible flap such that exhaled air from a wearer exits the exhalation valve with a downward component that directs the exhalate away from a wearer's eyes.

74. (previously presented) The filter face mask of claim 72, wherein the seal surface has multiple portions that include first and second side portions and a free-end portion, the free segment of the peripheral edge of the flexible flap having a flat configuration above the first and second side portions and the free end portion.

75. (previously presented) The filter face mask of claim 74, wherein the flexible flap's transverse curvature decreases towards the free segment of the peripheral edge of the flexible flap.

76. (previously presented) The filter face mask of claim 75, wherein the flexible flap lies flat against the seal surface that is disposed beneath the free end of the flexible flap.

77. (previously presented) The filter face mask of claim 70, wherein the valve seat and valve cover are inter-fitting plastic parts.

78. (previously presented) The filter face mask of claim 70, wherein the stationary portion of the flexible flap is configured for embracing a member on the valve seat.

79. (previously presented) The filter face mask of claim 70, wherein the exhalation valve is positioned on the mask body and the flexible flap is positioned on the valve seat such that the free portion of the flap resides below the stationary portion when the mask is worn in its normal upright position over the nose and mouth of the wearer.

80. (previously presented) The filter face mask of claim 79, wherein the flexible flap has no more than one free portion and no more than one stationary portion.

81. (previously presented) The filter face mask of claim 72, wherein the flexible flap is mounted to the valve seat off-center relative to the flap.

82. (previously presented) The filter face mask of claim 81, wherein the flexible flap is mounted closer to the stationary segment of the peripheral surface than to the free segment.

83. (previously presented) The filter face mask of claim 82, wherein the transverse curvature constitutes an arching of the flap in a dimension transverse to a longitudinal dimension of the flap.

84. (previously presented) The filter face mask of claim 83, wherein the flexible flap also has a curvature in the longitudinal dimension, which curvature is imparted to a central section of the flap.

85. (previously presented) The filter face mask of claim 84, wherein the transverse curvature of the flap decreases in the longitudinal dimension moving from a point where the flap is mounted to the valve seat towards the free segment of the flap's peripheral edge.

86. (previously presented) A filter mask that comprises:

(a) a mask body that is adapted to fit over the nose and mouth of a person; and

(b) a unidirectional exhalation valve that is mounted to the mask body to enable exhaled air to exit an interior of the mask body during an exhalation, the unidirectional exhalation valve comprising:

(i) a cantilevered flexible flap that has a stationary portion and a free portion and has a peripheral edge that includes opposing first and second side edges and opposing stationary and free edges, the stationary and free edges being located at opposing ends of a longitudinal axis of the flap, the first and second peripheral side edges extending between the stationary edge and the free edge,

(ii) a valve seat having sealing surfaces that contact the cantilevered flexible flap along the stationary and free edges and first and second side edges when the valve is closed; and

(iii) a valve cover that has a profiled block that engages the flexible flap at the stationary portion to press the flap towards the valve seat to cause the flexible flap to exhibit a curvature at least in a direction transverse to the longitudinal axis, the transverse curvature biasing the flap and maintaining the flap in substantially in contact with all the sealing surfaces of the valve seat in the absence of an opening pressure differential across the valve, under any orientation of the valve while also allowing the free edge and at least portions of the peripheral side edges to flex away from the respective sealing surfaces of the valve seat during an exhalation.

87. (previously presented) The filter mask of claim 86, wherein the profiled block engages the flap at a non-central location of the flap in a non-aligned relationship to the sealing surfaces to create an arched configuration transversely to the longitudinal axis, wherein the arched configuration decreases along the longitudinal axis in a direction going from the location where the profiled block engages the flap towards the free segment of the flap's peripheral edge, and wherein the flap is trapped between respective surfaces on the profiled block and on the valve seat.

88. (previously presented) The filter mask of claim 87, wherein the sealing surfaces have multiple portions that include first and second side portions and a free end portion, the free segment of the peripheral edge of the flexible flap having a flat configuration above the first and second side portions and the free end portion.

89. (previously presented) A filter mask that comprises:

(a) a mask body; and

(b) a unidirectional exhalation valve that is secured to the mask body, the unidirectional exhalation valve comprising:

(i) a flexible flap that has only one stationary portion and only one free portion and that has a peripheral edge that includes a stationary segment and a free segment, the stationary segment being associated with the stationary portion of the flap so as to remain stationary during an exhalation and the free segment of the flap being associated with the free portion of the flap so as to be moveable during an exhalation, the stationary and free segments of the peripheral edge being disposed at opposing ends of a longitudinal dimension of the flap;

(ii) a valve seat that has at least one port to allow exhaled air to exit the mask body when worn on a person, the valve seat also comprising a seal surface onto which the stationary and free portions of the flap make contact when no fluid is passing through the port(s), the free portion of the flap being capable of being lifted from the seal surface when a wearer exhales to allow exhalate to exit the mask, the seal surface surrounding the port(s) so that when the stationary and free portions of the flap are in contact with the seal surface fluid cannot pass through the port(s) in an opposite direction to enter the mask, the flexible flap being mounted to the valve seat to create a fixed curvature in the flap in a direction transverse to the longitudinal dimension, the fixed curvature being accomplished by exerting a force on the flexible flap to move the flap towards the valve seat such that the flap, at the location where the force is exerted, is non-aligned with the seal surface, the exerted force and the non-aligned relationship between the seal surface and the flap at the location of the force, imparting the curvature and biasing the flap towards the seal surface to enable the free portion of the flap to maintain substantial contact with the seal surface under any orientation of the mask when a fluid is not passing through the valve seat port(s).

90. (currently amended) The filter face mask of claim 89, further comprising a valve cover that has a profiled block extending therefrom, the profiled block engaging the flap so as to create the force needed to impart an arched curvature to the flap.

91. (previously presented) The filter face mask of claim 90, wherein the profiled block engages the flap at a non-central location of the flap in a non-aligned relationship to the sealing surfaces to create an arched configuration transversely to the longitudinal axis, wherein the arched configuration decreases along the longitudinal axis in a direction going from the location where the profiled block engages the flap towards the free segment of the flap's peripheral edge, and wherein the flap is trapped between respective surfaces on the profiled block and on the valve seat.

92. (previously presented) A filter mask that comprises:

(a) a mask body; and

(b) a unidirectional exhalation valve that is secured to the mask body, the unidirectional exhalation valve comprising:

(i) a flexible flap that has a stationary portion and a free portion and that has a peripheral edge that includes a stationary segment and a free segment, the stationary segment being associated with the stationary portion of the flap so as to remain stationary during an exhalation and the free segment of the flap being associated with the free portion of the flap so as to be moveable during an exhalation, the stationary and free segments of the peripheral edge being disposed at opposing ends of a longitudinal dimension of the flap;

(ii) a valve seat that has at least one port to allow exhaled air to exit the mask body when worn on a person, the valve seat also comprising a seal surface onto which the stationary and free portions of the flap make contact when no fluid is passing through the port(s), the free portion of the flap being capable of being lifted from the seal surface when a wearer exhales to allow exhalate to exit the mask, the seal surface surrounding the port(s) so that when the stationary and free portions of the flap are in contact with the seal surface fluid cannot pass through the port(s) in an opposite direction to enter the mask, the flexible flap being mounted to the valve seat in a cantilevered manner and to create a fixed curvature in the flap in a direction transverse to the longitudinal dimension, the fixed curvature being accomplished by exerting a force on the flexible flap to move the flap towards the valve seat such that the flap, at the location where the force is exerted, is non-aligned with the seal surface, the exerted force and the non-aligned relationship between the seal surface and the flap at the location of the force, imparting the curvature and biasing the flap towards the seal surface to enable the free portion of the flap to maintain substantial contact with the seal surface under any orientation of the mask when a fluid is not passing through the valve seat port(s).

93. (previously presented) The filter face mask of claim 92, further comprising a valve cover that has a profiled block extending therefrom, the profiled block engaging the flap so as to create the force needed to impart an arched curvature to the flap.

94. (previously presented) The filter mask of claim 92, wherein the flap's peripheral edge has two peripheral side edges located between a stationary end and a free end, wherein the free end and at least portions of the peripheral side edges are freely movable to flex away from portions of the seal surface that the flap would contact when in a closed condition.

95. (previously presented) A filter mask that comprises:

a mask body that is adapted to fit over the nose and mouth of a person; and

a unidirectional exhalation valve that is mounted to the mask body to enable exhaled air to exit an interior of the mask body during an exhalation, the exhalation defining a downstream direction and an opposite upstream direction, the unidirectional exhalation valve comprising:

a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice;

the cantilevered flexible flap defining a root end and a free end at opposite ends of a longitudinal axis of the flap, and two peripheral side edges respectively extending between the root end and the free end; wherein the root end, the free end, and the two side edges include upstream and downstream surfaces;

the valve seat having sealing surfaces that contact the flap along portions of the upstream surface of the root end, the free end, and the peripheral side edges when the fluid valve is closed;

the cantilevered flexible flap being mounted in contact with the respective sealing surface of the valve seat at the root end and being freely movable to flex away from the respective sealing surface of the valve seat at the free end and along at least portions of the peripheral side edges when fluid flows through the fluid valve and the fluid valve is open; and

wherein said mounting of the flexible flap to the valve seat creates a fixed curvature in the flap in a direction transverse to the longitudinal axis, the fixed curvature resulting from a force being applied to the flap at a position proximate the root end and between the peripheral side edges, the applied force moving the flap upstream at the applied position and thus imparting the curvature, the curvature resulting in maintaining the flap substantially in contact with the sealing surfaces of the valve seat in the absence of an opening pressure differential across the flap, in any orientation of the valve.

96. (previously presented) The mask of claim 95, wherein the transverse curvature in the flap includes a fixed transverse curvature in the root end of the flap at a location spaced inward from the portion of the root end that contacts the sealing surface.

97. (previously presented) The mask of claim 95, further comprising a valve cover having a block for mounting the flap in contact with the sealing surfaces; wherein the block exerts the force in the upstream direction to the lower surface of said flap resulting the transverse curvature.

98. (previously presented) The mask of claim 97, wherein the transverse curvature in the flap includes a fixed transverse curvature in the flap in said root end at a location of said root end located between the block and the portion of the of the root end that contacts the sealing surface.

99. (previously presented) The mask of claim 98, wherein said block has a width that is less than a transverse distance between opposite side edges of the orifice.

100. (previously presented) The mask of claim 95, wherein said cantilevered arrangement of said flexible flap is defined by the flap being supported proximate said root end and the free end being unsupported.

101. (previously presented) The mask of claim 97, wherein said cantilevered arrangement of the flexible flap is defined by said flap being supported by at least said block at or adjacent said root end, and by the free end being unsupported.

102. (previously presented) The mask of claim 97, wherein said cantilevered arrangement of the flexible flap is defined by said flap being supported between said block and the sealing surfaces at the root end, and by the free end being unsupported.

103. (previously presented) The mask of claim 97, wherein the root end includes an outer edge surface, and wherein the sealing surface contacts the root end inward from the outer edge surface.

104. (previously presented) A filter mask that comprises:

a mask body that is adapted to fit over the nose and mouth of a person; and

a unidirectional exhalation valve that is mounted to the mask body to enable exhaled air to exit an interior of the mask body during an exhalation, the exhalation defining a downstream direction and an opposite upstream direction, the unidirectional exhalation valve comprising:

a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice;

the cantilevered flexible flap defining a root end and a free end at opposite ends of a longitudinal axis of the flap, and two peripheral side edges respectively extending between the root end and the free end; wherein the root end, the free end, and the two side edges have upper and lower surfaces;

the valve seat having sealing surfaces that contact the flap along portions of the upstream surface of the root end, the free end, and the peripheral side edges when the fluid valve is closed;

the cantilevered flexible flap being mounted in contact with the respective sealing surface of the valve seat at the root end and being freely movable to flex away from the respective sealing surface of the valve seat at the free end and along at least portions of the peripheral side edges when fluid flows through the fluid valve and the fluid valve is open; and

wherein the mounting of the flexible flap to the valve seat creates a fixed curvature in the flap in a direction transverse to the longitudinal axis, the fixed curvature resulting from a force being applied to said flap in an upstream direction at a position proximate the root end and between the peripheral side edges, the applied force moving the flap upstream at the applied position and thus imparting the curvature, the curvature resulting in maintaining the flap substantially in contact with the sealing surfaces of the valve seat in the absence of an opening pressure differential across the flap, in any orientation of the valve;

wherein the transverse curvature in the flap includes a fixed transverse curvature in the root end of the flap at a location spaced inward from the portion of the root end that contacts the sealing surface;

wherein the cantilevered arrangement of the flexible flap is defined by said flap being supported proximate the root end, and by said free end being unsupported.

105. (previously presented) The mask of claim 103, further comprising a valve cover having a block for mounting said flap in contact with said sealing surfaces; wherein the block exerts the force in the upstream direction to the lower surface of the flap resulting the fixed transverse curvature.

106. (previously presented) The mask of claim 105, wherein the transverse curvature in the flap includes a fixed transverse curvature in the flap in the root end at a portion of the root end located between the block and the portion of the of the root end that contacts the sealing surface.

107. (previously presented) The mask of claim 106, wherein the block has a width that is less than a transverse distance between opposite side edges of the orifice.

108. (previously presented) The mask of claim 105, wherein the cantilevered arrangement of the flexible flap is defined by the flap being supported by at least the block at or adjacent the root end, and by the free end being unsupported.

109. (previously presented) The mask of claim 105, wherein the cantilevered arrangement of the flexible flap is defined by the flap being supported between the block and the sealing surfaces at the root end, and by the free end being unsupported.

110. (previously presented) The mask of claim 105, wherein the upper surface of the root end includes an outer edge surface, and wherein the sealing surface contacts the root end inward from the outer edge surface.

111. (previously presented) A filter mask that comprises:

a mask body that is adapted to fit over the nose and mouth of a person; and

a unidirectional exhalation valve that is mounted to the mask body to enable exhaled air to exit an interior of the mask body during an exhalation, the exhalation defining a downstream direction and an opposite upstream direction, the unidirectional exhalation valve comprising:

a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice; the cantilevered flexible flap defining a supported end and a free end at opposite ends of a longitudinal axis of the flap, and two peripheral side edges respectively extending between the supported end and the free end; wherein the supported end, the free end, and the two side edges include upstream and downstream surfaces;

the valve seat having sealing surfaces that contact the flap along portions of the upstream surfaces of the supported end, the free end, and the peripheral side edges when the fluid valve is closed;

the cantilevered flexible flap being mounted in contact with the respective sealing surface of the valve seat at the supported end and being freely movable to flex away from the respective sealing surface of the valve seat at the free end and along at least portions of the peripheral side edges when fluid flows through the fluid valve and the fluid valve is open; and

wherein the mounting of the flexible flap to the valve seat creates a fixed curvature in the flap in a direction transverse to the longitudinal axis, the fixed curvature resulting from a force being applied to said flap at a position within the supported end and between the peripheral side edges, the applied force moving the flap upstream at the position and thus imparting the curvature, the curvature resulting in a biasing of the flap towards the seal surface to enable the free end of the flap to maintain substantial contact with the sealing surfaces in the absence of an opening pressure differential across the flap, in any orientation of the valve.

112. (previously presented) The mask of claim 111, wherein the transverse curvature in the flap includes a fixed transverse curvature in the supported end of the flap at a location spaced inward from the portion of the of the supported end that contacts the sealing surface.

113. (previously presented) The mask of claim 111, further comprising a valve cover having a block for mounting the flap in contact with said sealing surfaces; wherein said block exerts a force in the upstream direction to said lower surface of the flap resulting the fixed transverse curvature.

114. (previously presented) The mask of claim 113, wherein the transverse curvature in the flap includes a fixed transverse curvature in the flap in the supported end between the profiled block and the portion of the of the supported end that contacts the sealing surface.

115. (previously presented) The mask of claim 114, wherein the block has a width that is less than a transverse distance between opposite side edges of the orifice.

116. (previously presented) The mask of claim 111, wherein the cantilevered arrangement of the flexible flap is defined by the flap being supported at the supported end and the free end being unsupported.

117. (previously presented) The mask of claim 113, wherein the cantilevered arrangement of the flexible flap is defined by the flap being supported by at least the block at the supported end, and by the free end being unsupported.

118. (previously presented) The mask of claim 113, wherein the cantilevered arrangement of the flexible flap is defined by the flap being supported between the block and the sealing surfaces at the supported end, and by the free end being unsupported.

119. (previously presented) The mask of claim 113, wherein the root end includes an outer edge surface, and wherein said sealing surface contacts said supported end inward from the outer edge surface.

120. (previously presented) A filter mask that comprises:

a mask body that is adapted to fit over the nose and mouth of a person; and

a unidirectional exhalation valve that is mounted to the mask body to enable exhaled air to exit an interior of the mask body during an exhalation, the exhalation defining a downstream direction and an opposite upstream direction, the unidirectional exhalation valve comprising:

a cantilevered flexible flap and a cooperating valve seat surrounding a valve orifice;

the cantilevered flexible flap defining a supported end and a free end at opposite ends of a longitudinal axis of the flap, and two peripheral side edges respectively extending between the supported end and the free end; wherein the supported end, the free end, and the two side edges include upstream and downstream surfaces;

the valve seat having sealing surfaces that contact the flap along portions of the upstream surfaces of the supported end, the free end, and the peripheral side edges when the fluid valve is closed;

the cantilevered flexible flap being mounted in contact with the respective sealing surface of the valve seat at the supported end and being freely movable to flex away from the respective sealing surface of the valve seat at the free end and along at least portions of the peripheral side edges when fluid flows through the fluid valve and the fluid valve is open; and

means for mounting the flexible flap to the valve seat wherein the mounting means creates a fixed curvature in the flap in a direction transverse to the longitudinal axis, the curvature resulting in a biasing of the flap towards the seal surface to enable the free end of the flap to maintain substantial contact with the sealing surfaces in the absence of an opening pressure differential across the flap, in any orientation of the valve.

121. (previously presented) The valve of claim 120, wherein the mounting means includes a block that exerts a force in the upstream direction to the flap's downstream surface at a position within the supported end and between the peripheral side edges, the applied force moving the flap upstream at the exerted position and thus imparting the curvature.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.